

Z Politikberat (2009) 2:685–695  
DOI 10.1007/s12392-010-0219-y

FORUM

**ZPB**  
ZEITSCHRIFT FÜR  
POLITIKBERATUNG

## The e-skills landscape in South Africa

### The issues of demand and supply and the use of international benchmarks to inform the South African e-skills development context

Philipp Merkofer · Angela Murphy

**Abstract:** This article provides an overview of the key findings of a recent Accenture Research study on the e-skills shortage in South Africa. Within the context of e-skills demand, the article reveals the challenge of accurate assessment in the face of inconsistent demand data and presents the need for a standardised definition of e-skills demand. It also highlights key factors constraining the supply of e-skills in South Africa and the critical role of education in this regard. To further inform and support the e-skills development context in South Africa, the article offers insights into the necessity and value of collaboration between government, industry and educators. This was identified in interviews with players from the information and communication technology (ICT) industry and tertiary education sector as well as from a benchmarking study on the ICT policies and key learnings of six countries.

**Keywords:** E-skills · Standardisation · Benchmarking · Education · Collaboration

### IT-Qualifikationen in Südafrika – Die Situation von Angebot und Nachfrage und der Nutzen von internationalen Maßstäben für die Beratung im Kontext der südafrikanischen Entwicklung

**Zusammenfassung:** Dieser Artikel gibt eine Übersicht der wichtigsten Ergebnisse einer Accenture-Research-Studie zur Knappheit von sogenannten „e-Skills“ (IT-Qualifikationen) in Südafrika. Dabei werden die Schwierigkeit einer genauen Bewertung angesichts inkonsistenter Datenlage zur Nachfrage thematisiert und die Notwendigkeit für eine standardisierte Definition der Nachfrage von IT-Qualifikationen unterstrichen. Schlüsselfaktoren, die das Angebot von IT-Qualifikationen in Südafrika beschränken, werden angesprochen, insbesondere die entscheidende Rolle der richtigen Bildung. Der Artikel gibt auch Einblick über die Notwendigkeit und den Nutzen einer engen Zusammenarbeit von Regierung, Industrie und Bildungsinstitutionen zur Unterstützung

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**Published online:** 13.03.2010  
© VS-Verlag 2010

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der Entwicklung von IT-Qualifikationen. Identifiziert wurde dies in Interviews mit Vertretern der Informations- und Kommunikationstechnologie (IKT) aus Industrie und Bildungssektor und in einer Benchmarking-Studie zur IKT-Politik und Lernerfolgen von sechs Ländern.

**Schlüsselwörter:** IT-Qualifikationen · Standardisierung · Benchmarking · Bildung · Zusammenarbeit

#### KEY MESSAGE

Collaboration between relevant stakeholders (government, industry and educators) is imperative to effectively address an e-skills shortage and transform a country into an ICT “powerhouse”.

In the case of South Africa, a standardised definition and conceptualisation as well as reliable forecast figures for the demand of e-skills are needed to begin with. Based on that, curricula for secondary and tertiary education have to be developed in order to overcome the “digital divide” and establish a broad talent pool. The more so as companies argue that specialised e-skills are not a primary component of tertiary education. Yet, companies should consider employing staff from a wider range of academic disciplines and even career changers.

## 1 Background and objective

The importance of information and communication technology (ICT) has increased in modern times and is nowadays broadly integrated into most functions of the economy, business and society. Organisational success in this knowledge intensive economy is increasingly dependent on skilled human resources. In light of the current e-skills shortage, it is imperative for nations to forecast skills for ICT professionals in the future and to find ways to up-skill human resources providing them with meaningful careers and the ability to effectively compete in the global knowledge economy.

Against this backdrop the gap between e-skills demand and supply is a topic examined widely in both the developed and developing world (JOBS-IRIS Bangladesh 2006; El-Gabaly and Majidi 2003; Steedman et al. 2003). Developing countries such as South Africa face a greater challenge owing to the larger deficit of available infrastructure to build e-skills at an educational and community level. Such countries are also characterised by economic disparities resulting in a wealthy and educated minority having more access to information technologies and the disadvantaged majority increasingly being left on the other side of a growing “digital divide”.

In South Africa, there are currently a large number of e-skills training initiatives within the ICT sector aimed at addressing these gaps.<sup>1</sup> While programs exist at secondary, tertiary and industry levels, a systematic and integrated approach to addressing the skills

<sup>1</sup> There are a number of established and newly implemented strategies of the South African government designed to encourage the development and growth of the ICT sector and its skills base. A few examples of these training schemes include SAITS Implementation Initiatives with the Department of Trade and Industry; Meraka Institute and Meraka eSkills Institute; Department of Labour initiatives; Sector Education and Training Authority (SETA) initiatives; Skills Development Strategy for South Africa; and JIPSA (Joint Initiative on Priority Skills Acquisition).

shortages across the spectrum of basic e-literacy skills, general workplace e-skills and top end ICT specialist skills, is lacking.<sup>2</sup>

In response, the Presidential International Advisory Council on Information Society and Development (PIAC on ISAD) recommended in 2006 that an e-Skills Council be formed to support government's strategic objectives and ensure that the country is producing an adaptable and industry-ready workforce. The South African e-Skills Council is a partnership between government, the private sector and educators providing strategic advice to the President on information and communication technology related issues, as well as on programs and services that could have a measurable impact on e-skills development.

As a member of the e-Skills Council, Accenture was requested to conduct primary and secondary research on the topic of the e-skills shortage in South Africa as well as a benchmarking exercise to inform the context of e-skills development.

Research objectives included:

- An overview of the current and future demand for e-skills in South Africa as is reflected in existing research;
- Perspectives on the current and future supply of e-skills in South Africa as held by tertiary institutions and key employers within the industry;
- Benchmark ICT improvement policies and key learnings of six countries (Finland, India, Ireland, Mexico, Vietnam and Cuba) and draw conclusions for the South African context.

Following, in summary, is an overview of our findings and some conclusions for the current and future state of the e-skills landscape in South Africa.

## **2 Inconsistent demand data—the challenge of accurate assessment in the absence of a consistent definition**

Our analysis of the existing data and reports on the topic of e-skills demand revealed that due to different definitions and conceptualisations used by government organisations, research institutions and other experts, it is difficult to accurately assess the actual and future demand figures for e-skills in South Africa. Nevertheless, here are some basic findings.

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2 In terms of a standardized e-skills definition, this study used a simplified version of the five level e-skills pyramid proposed by the South African e-Skills Council and defines e-skills according to three categories or levels: *Level 1 (e-literacy)*—e-skills that are needed for modern life outside the workplace and often defined as e-literacy or digital literacy; *Level 2 (e-skills)*—e-skills that are used as a tool in the workplace but are not part of the job (for example basic users who can competently use generic tools such as MS Word or advanced users who can use sector specific software tools); and *Level 3 (ICT specialist)*—ICT specialists who have technical skills needed both in the ICT industry and related jobs in ICT enabled industries (this includes high-end ICT research and development skills and people with the ability to develop and maintain ICT systems and where ICT is an integral job component). See also Vanska et al. (2008) and Primo and Wesso (2007).

There have been only a few reports in recent years which examine the concept of e-skills demand in South Africa across all industries. According to industry analysts and government sources the need for ICT workers ranges between 22,000 and 38,000 in 2007. These reports, however, make use of different definitions for the research and it is likely that the true demand figures lie somewhere between the two.

In addition, most of the existing research focuses only on the top level of e-skills (i.e. ICT specialists), while ICT workers with lower skills levels are not represented. Comparatively, the availability of data on general e-skills (commonly used for the workplace) and basic e-literacy is not as comprehensive.

The demand picture across different industries is not much clearer. It seems that not every industry or sector in South Africa has comprehensive data available on e-skills demand and specifically on demand for ICT specialists. E-skills are often only mentioned as a scarce or critical skill, but no quantification exists.

Information is available for the ISETT industry (Information Systems, Electronics and Telecommunications Technologies) as well as for the Banking sector. According to a survey by ISETT SETA (Sector Education and Training Authority) amongst the biggest ICT companies representing two-thirds of all the employees in the sector, there were 4,671 vacancies for ICT occupations in 2007: 58% of those positions were for ICT Professionals, 30% for ICT Technicians and Trade Workers and 9% for ICT Managers.<sup>3</sup> ICT skills were also identified as topping the list of scarce skills in the banking sector in 2006. According to BANK-SETA, there is a strong need for ICT managers (129 positions or 27% of all manager vacancies) and for ICT professionals (177 positions or 35% of all professional positions).<sup>4</sup>

Looking across industries, overall there is currently a strong demand for people with general and advanced ICT specialist skills, ranging from process management and applications development to advanced technology skills.

A strong demand exists for skilled professionals in process management, configuration and change management (CCM) and development, according to ITWeb's 2006 IT Skills Survey. In addition, up until 2007 a high growth in demand is seen in the Application Development, Systems Analysis and Database Development sectors. According to the Department of Labour, it was found that ICT managers, software and applications programmers, and ICT network & support professionals are in highest demand, requiring more than 6,000 people within each sector to satisfy current (2007) demand.<sup>5</sup>

This research revealed that there is also a strong demand for ICT workers with additional soft skills such as business, communication and people management skills. Project management, presentation and communication skills and mentoring are listed as the most sought-after capabilities in ICT workers.

In respect of the future demand for e-skills, the research showed that there is currently insufficient forecast data available for South Africa. Some industry analysts however

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3 Data is taken from the ISETT SETA Sector Skills Plan 2005–2010, published in 2007.

4 Data is taken from the BANK-SETA Sector Skills Plan 2008/9 Update, published in 2006.

5 See the "National Master Scarce Skills List for South Africa 2007", published by the Department of Labour in 2008.

state that the demand for ICT skills in South Africa will exceed the supply by more than 20% in 2009.

### 3 Education is critical to e-skills supply

In addition to reviewing research on e-skills demand in South Africa, we undertook primary research into the e-skills supply situation to build a more comprehensive picture.

Currently, the ICT industry shows the highest degree of skills mismatch caused by the dynamic of an industry with extremely short development cycles. The industry has a fundamental need for employees who are digitally literate as well as an increasing need for employees with more advanced e-skills who are able to manage and operate new business applications. All other industry and business sectors are increasingly requiring the whole workforce to be digitally literate. As new tools and technologies are adopted this need will grow to also include more advanced skills.

The primary research was conducted using a combined qualitative and quantitative approach by interviewing and surveying key ICT players in both South African industry and tertiary education sectors. The primary objectives were to understand:

- the nature of the job functions and skills requirements within the ICT sector
- the extent to which these skills requirements are being addressed by training institutions
- the extent of the e-skills deficit

Three separate studies were conducted with three target groups

1. interviews with people responsible for either the training or recruitment of IT personnel in 53 companies drawn from seven industries; Information Technology, Communications and Telecommunications, Multimedia, Electronics, Government, Banking and Insurance.
2. interviews with 20 Heads of Departments or Faculty Deans of Computer Science and/or Information Systems from accredited comprehensive universities, technology universities, private universities,<sup>6</sup> private institutions and FET colleges.
3. a pulse survey completed by 153 employees of a large, global ICT firm which examined the perspective of the individual.

The following sections will discuss the findings from each of the three studies separately.

#### 3.1 Challenge one: The gap between higher education and work readiness—Findings from interviews with key players in South African industry

The primary theme that emerged from this component of the research referred to the extent of the discrepancy between the skills requirements of business and the skills that students graduate with from tertiary institutions. Employees with skills at the ICT special-

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6 This refers to universities that do not receive any form of government subsidies but are reliant on their own funding.

ist levels were found to be scarce with most companies experiencing recruitment difficulties in this area. The greatest recruitment concern for companies was the lack of industry expertise and quality skills and experience in both technical aspects as well as softer skills such as communication, negotiation and project management.

The reasons for difficulties in sourcing candidates was attributed to a limited talent pool as a result of a lack of skills in the market place, the increasing frequency of specialised technologies that are company and industry specific, high salary expectations of skilled candidates, poaching from competitors and the brain drain. A concern was also expressed regarding the lack of practical experience which tertiary institutions provide to their students. Consequently there is need to bridge a large gap before graduates are work ready.

Social, demographic and environmental factors that are primarily perceived by companies to impact on the deficit of e-skills in the country are largely due to the lack of access to computers and the internet at school level as well as within disadvantaged or rural communities. Additional issues that were commented on included HIV/AIDS and the migration of experienced and skilled people as a result of a range of socio-political factors. Few companies reported that they actually take these factors into account when designing resourcing strategies.

There are not enough highly qualified individuals with significant levels of experience in the industry. Training personnel to acquire specialised skills is expensive as the cost of training courses increases with their level of specialisation. Training is also time consuming and resource intensive contributing to increased pressure within the work environment due to personnel being unavailable during training periods.

### 3.2 Challenge two: The ability of the school system to build the foundation—Findings from interviews with key players in the tertiary education ICT sector

This component of the research revealed that the many developmental gaps faced by tertiary institutions in the education of their students originate back to challenges within the secondary school environment that is then carried through to tertiary level. This situation is intensified for students from disadvantaged communities as they have received little or no exposure to ICT equipment and tools.

Institutions closer to the more rural areas highlighted two groups of students who do not successfully follow through with their chosen ICT related course along with their distinguishing characteristics. The two groups include students who are under-prepared and those of lesser means. The primary concerns are that insufficiently prepared students who enter tertiary education find the course work difficult and drop out early in their first year of study. Poorer students of lesser means from more disadvantaged backgrounds struggle to pay fees and as a result tend to drop out later in the year. In addition, factors such as limited resources (personnel, equipment and space) and the lack of funding support (from both government and industry) were also seen as core issues. Skills retention in these institutions is also a significant challenge as lecturers within academic environments are often lost to industry where salaries are more competitive.

The calibre of the IT student also differs vastly across institutions. Most institutions, with the exception of private universities, present major discrepancies with regard to stu-

dent performance. While private universities tend to have high performing students from private schooling systems, rural universities contain mostly underperforming students. This discrepancy between high performing, highly skilled students and students with no background in computers is the greatest obstacle that tertiary institutions need to overcome. These challenges stem primarily from different levels of schooling that learners receive as a result of various demographic and socio-economic factors and the vast difference between advantaged and disadvantaged schools in South Africa. In order to overcome these challenges, the tertiary institutions are adapting their curricula accordingly.

### 3.3 Challenge three: Gaps in the curricula—Findings from the pulse survey that provides the individual perspective

Five in ten of the respondents that participated in the pulse survey maintain that e-skills taught at tertiary level do not sufficiently prepare them for the expectations of their roles in employment. Individuals also felt that the practical application of the skills taught was a significant missing component from tertiary training. Respondents indicate an equal need for computer literacy, specialist e-skills and soft skills. Soft skills that were highlighted included client management, communication, leadership, time management, project management and negotiation skills.

## 4 International benchmarking

Benchmarking research was conducted on ICT improvement policies and key learnings of six countries selected by the e-Skills Council (Finland, India, Ireland, Mexico, Vietnam and Cuba), to inform the e-skills development context in South Africa.

The Global Information Technology report of the World Economic Forum (2007) states that South Africa lags behind in most key dimensions that determine the ready availability of e-skills compared with the sample countries. In respect of education, the “Quality of mathematics and science education” in South Africa lags heavily behind Finland, India, Ireland, Vietnam and Mexico (the WEF report has no data for Cuba). The same can be said for “Government prioritisation of ICT” where South Africa fares only slightly better than Mexico but is still much lower than the other countries in the sample. Only with regard to the dimension “Extent of staff training”, that measures the involvement of business, is South Africa perceived as investing more than India, Mexico or Vietnam (and almost as much as Finland and Ireland).<sup>7</sup>

A qualitative assessment showed that all six countries still have diverse e-skills issues and challenges, due to the fact that the sample included countries from the developed as well as the developing world. However, for all the diversity there are also significant commonalities with regard to implementing ICT improvement policies. Each country has a number of key players in the ICT sector. Government departments and related institutions are the backbone with industry and academia filling in the gaps. Other commonalities

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<sup>7</sup> For detailed scores in the different categories see the Global Information Technology Report, published by the World Economic Forum (WEF) in 2008.

include the importance of education and government support, addressing connectivity problems and buy-in from industry. In some countries there is good government support resulting in well-planned and practical ICT initiatives. In others, while there are great ideas, the conversion of ideas to practical action plans is not very evident.

Collaboration between government and industry and industry and academia/research institutions respectively is of high importance while implementing ICT improvement policies. The common theme is that the only way a country can become an ICT “powerhouse” is if all relevant stakeholders join hands and work together to increase the skills base, the adoption of the technologies and the utilisation of facilities. Some examples of collaboration include industry supporting research institutions with funding or workplace experience while government supports citizens by making information and communication technologies publicly available through communal centres. Improvements in the education sector included making more technologies available to schools, improving connectivity and upgrading teacher training. Collectively, these improvement policies all add to countries becoming more ICT empowered.

## 5 Conclusion and observations

The results of the study provided insight into the key issues and challenges impacting the progress of e-skills development in the South African context. It also provided to the e-Skills Council an overview of programs and services that are presently being implemented and that could have a measurable impact on e-skills development. This study was the first step towards transformation of the information and communication technology landscape by highlighting the need for better integration of existing strategies and more effective communication and collaboration between the various stakeholders.

In a presentation of the findings to the then President of the Republic of South Africa, Mr. Thabo Mbeki, at a meeting of the Presidential International Advisory Council on Information Society and Development (PIAC on ISAD) in September 2008, the following observations were highlighted:

- There is a lack of reliable forecast figures for the overall demand of e-skills in South Africa as well as by industry and job function. Accenture believes that there is a need for a standardised definition and conceptualisation of e-skills demand that is both properly quantifiable and measurable. There could also possibly be a need for a reliable forecasting instrument for overall e-skills demand as well as for demand by industry and job function.
- A potential route to standardisation is to relate the concept of either e-skills shortage or demand to productivity within a business. Workplace Skills Plans of companies should integrate a new section dedicated to productivity. Valuable data could then be collected to attain a more comprehensive picture (see Daniels 2007).
- Supply of e-skills is constrained by a number of factors such as the low level of mathematics which limits enrolment for ICT related degree courses, the global recession in ICT which has given learners the impression that there is no demand for ICT graduates and the lack of ICT resources in both secondary and tertiary institutions.



- There is a lack of integration between employer expectations and the tertiary curriculum which has resulted in a mismatch between the skills available in graduates and the expectations of industry, particularly in respect of specialist software and industry specific knowledge. The lack of soft skills training and actual work experience opportunities provided by tertiary institutions is also identified as a major gap in training by both individuals and companies.
- Companies argue that there is an increasing need for specialised industry skills which are unlikely to be a primary component of the tertiary curriculum as educational institutions are providing mainly generalist training without sufficiently focusing on career requirements. Thus, a growing number of business and industry associations link the shortfall of highly skilled ICT staff with weaknesses in educational curricula and associated teaching methods. Graduates are therefore not considered work ready and are perceived to require intensive training.
- Companies are not prepared to employ from a wide range of academic disciplines when employing graduates seeking first employment but tend to rather focus specifically on ICT courses. This presents a restriction on the available pool of recruits by excluding those that are self-taught, had switched careers or were seeking permanent employment after a spell in self-employment.
- There is limited collaboration between industry and tertiary institutions in terms of initiative development with tertiary institutions feeling that companies could do more to contribute financially towards skills development.
- All stakeholders agree that the primary social and environmental contributors to the supply shortage of e-skills are the lack of ICT training initiatives at secondary school level and the limited access to information and communication technology in homes and communities, especially in rural areas. Recommendations for future initiatives include suggestions to revise ICT training at secondary school level and to facilitate access to ICT resources in less privileged communities.
- The benchmarking analysis clearly revealed that collaboration between all relevant stakeholders (government, industry and educators) is imperative to effectively address an e-skills shortage and transform a country into an ICT “powerhouse”.

## 6 Next Steps

Due to the elections in April 2009 and the subsequent transition of government to the newly elected President of the Republic of South Africa, Mr. Jacob Zuma, any fast-track implementation of recommendations by the e-Skills Council and the Presidential International Advisory Council on Information Society and Development (PIAC on ISAD) have been initially delayed. However, the new government administration recently renewed its commitment to education and job creation playing a central role in the current presidential term.

The Department of Communication recently launched the National e-Skills Dialogue Initiative (NeSDI). A primary goal of NeSDI is to engage a spectrum of relevant role players from government, industry, social partners and academia in multi-stakeholder

dialogue and action-oriented partnerships to address the ICT skills shortage in South Africa.

The initiative is a direct result of the comprehensive report submitted by the e-Skills Council in September 2008 that recommended the “urgent” development and implementation of a national programme “to achieve large scale improvement in the supply of those ICT skills for which there is a need in industry”.

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